



Transforming the New Construction Market in Shanghai

上海新建筑的市场转型

Rob Watson

罗伯特 瓦特森

美国自然资源保护委员会(NRDC)

Shanghai

September 8, 2003



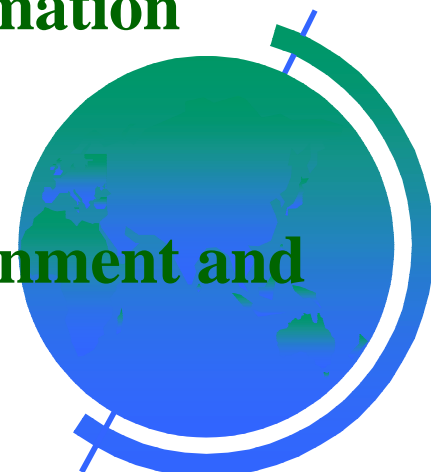
About NRDC 美国自然资源保护委员会

- **Founded in 1970**
成立于1970年
- **Law, Science, Policy and People in defense of the Earth**
通过法律、科学、政策和人的力量保护地球
- **4 Offices; 250 professionals**
4个办事机构；250名专业人员
- **520,000 Members**
全美520,000名会员
- **www.nrdc.org**



Overview 概述

- **Buildings have needs and impacts far beyond energy new construction best place to influence**
建筑的需求和影响远远超出能源本身，新建筑最能够对此产生影响。
- **In new construction, many actors need to participate, but ESCOs will be only a niche player**
新建建筑需要众多参与者，但能源服务公司将是唯一能够瞄准机会的一方。
- **Success requires a conscious market transformation strategy**
成功取决于有意识的市场转型策略。
- **Success requires a partnership between government and the private sector**
成功取决于政府和企业界的伙伴关系。



What are “Green” Buildings?

什么是“绿色”建筑？

Design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment and occupants in five broad areas:

**建筑设计和施工在五个方面明显降低或消除建筑对环境
和用户的负面影响：**

- **Sustainable site planning**
 - 场址规划的可持续性
- **Safeguarding water and water efficiency**
 - 保护水体和节水
- **Energy efficiency and renewable energy**
 - 能效和可再生能源
- **Conservation of materials and resources**
 - 节约材料和资源
- **Indoor environmental quality**
 - 室内环境质量



How We See Buildings 我们看到的建筑



What We Don't See 我们没看到的







Energy use & atmospheric emissions 用能与排放

消耗全美
65.2%的电能

使用全美**40-45%**以上的一次能源

排放全美**40-45%**的温室气体

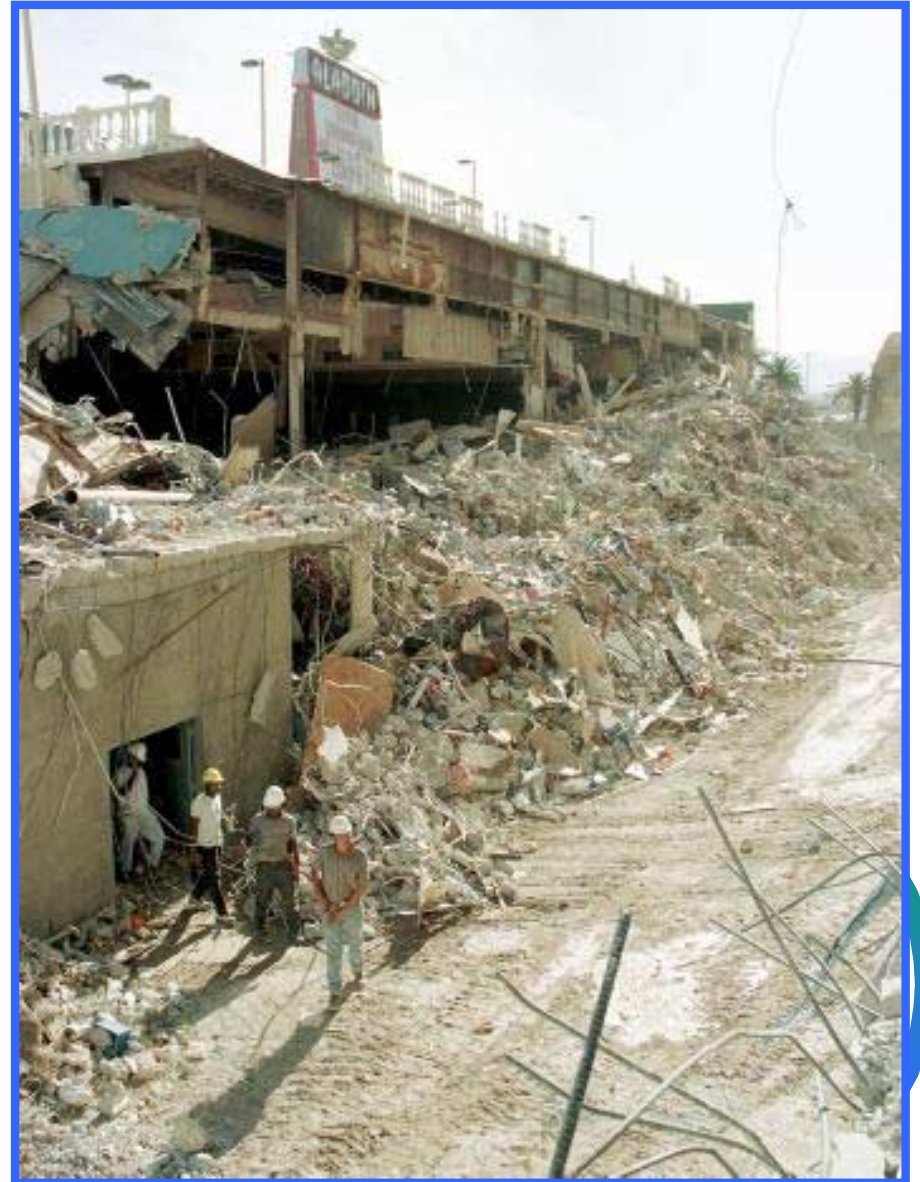


40-50% of all materials and wood use
占各种材料和木材使用的40-50%



35-40% of municipal solid waste

占城市固体垃圾的**35-40%**



消耗美国**80%**的饮用水

© argus



700,000 hectares developed each year in China
中国每年开发70万公顷土地



**Forests and farmland are being replaced by
development**

森林和农田正被开发项目占用



Benefits of Green Building

绿色建筑的效益

- **Environmental Benefits 环境效益**
 - **Reduce the impacts of natural resource consumption by 30-70%**
将自然资源消耗的影响减少**30-70%**
- **Health and Safety Benefits 健康与安全效益**
 - **Enhance occupant comfort and health**
改善用户舒适度与健康水平
- **Community Benefits 社区效益**
 - **Minimize strain on local infrastructure and improve quality of life**
减少对当地基础设施的压力、提高生活质量
- **Economic Benefits 经济效益**
 - **Productivity 提高工作效率**
 - **Reduced Operating Costs 降低运行费用**



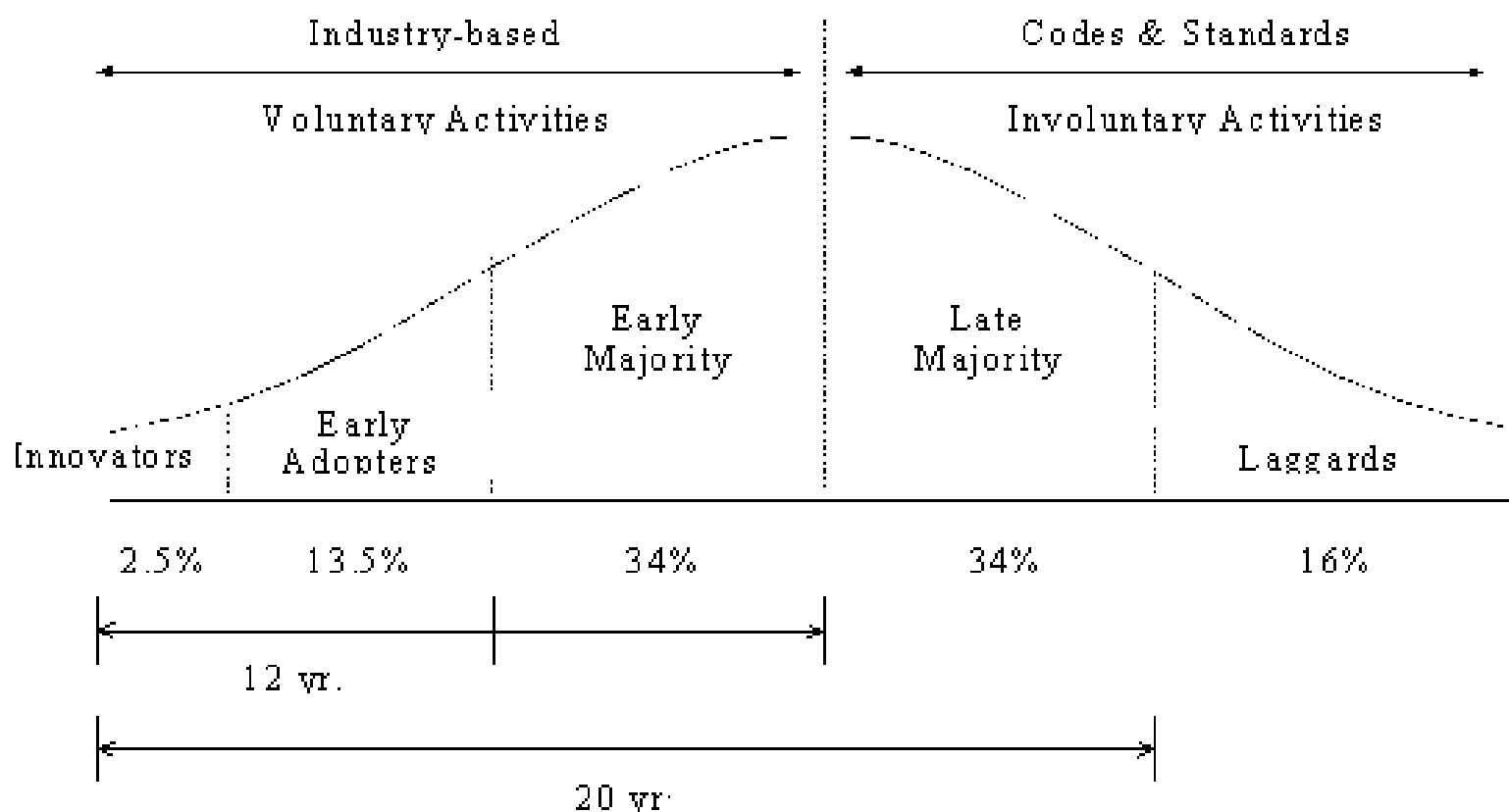
Lost Opportunities 失掉的机遇

- **New construction is the best time to capture benefits of green building and transform the market**
新建筑是抓住绿色建筑效益和市场转型的最好时机。
- **If opportunity is missed initially, waste and damage could go on for years**
如果失掉最初的机会，浪费和破坏则将持续多年。
- **Marginal cost is lowest**
此时的边际成本最低
- **Opportunities for integration can result in additional benefits and eliminate extra costs**
抓住整合的机会可带来额外效益并消除额外成本。



Market Composition

市场组合



Market transformation programs try and reduce 80% penetration time from 20 yr. to 12 yr.

Prerequisites for Market Transformation 市场转型的前提

Requires the presence of: 要求具备:

- **Standards and Codes** 标准和规范
- **Design & Construction Expertise** 设计和施工专长
- **Materials and Equipment** 材料和设备
- **Enforcement and Administration**
强制实施和管理
- **Means to go beyond Code**
超越规范的手段

**“A chain breaks at its weakest link”
“链条断于其最薄弱的环节”**





Transforming the New Construction Market 新建筑市场转型

➤ Step 1: Energy Efficient Building Demonstrations

第 1 步：节能建筑示范

➤ Step 2: Technical development of standards

第 2 步：标准的技术开发

➤ Step 3: Develop “early adopter” incentive programs

第 3 步：制定对“早期采用标准者”的激励方案





Transforming the New Construction Market 新建筑市场转型

➤ Step 4: Training for building sector and code officials

第 4 步：培训建筑行业 and 从事规范工作的官员

➤ Step 5: Implementation and Enforcement

第 5 步：实施和强制执行

➤ Step 6: Increase stringency of/go beyond the codes

第 6 步：提高规范的严格性/超越规范



Role of ESCOs in New Construction

能源服务公司在新建筑上的作用

- **Historically, ESCOs are not well suited for new construction market**

历史上，能源服务公司与新建筑市场不充分匹配

- **Not connected with normal decision makers (owners vs. occupants)**
与通常的决策者（业主与用户）没有联系
- **Performance contracting not appropriate**
不适合采用性能性合同
 - **No baseline**
没有参考基准
 - **ESCOs too small & poorly capitalized for most projects**
能源服务公司太小，其价值未计入建筑价值
- **Energy too narrow: need to develop BUSCOs (Building Services Co.) to meet green building needs**
内涵太狭窄：需要成立建筑服务公司，以满足绿色建筑的需求
- **Can play niche role in aspects of market transformation**
可抓住时机推动市场转型



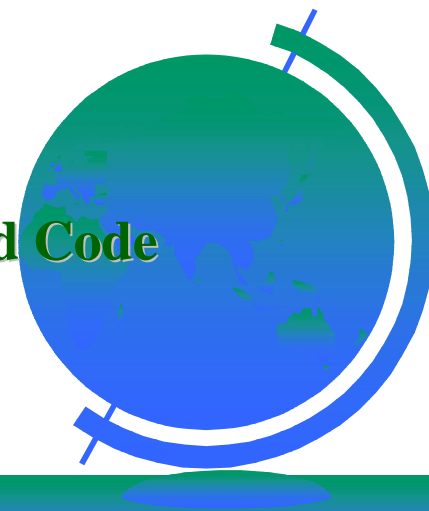
Building Demonstrations 建筑示范

- **Involve Innovators** 创新者参与
- **Show the possible** 展示可能的
 - **Design** 设计
 - **Technology** 技术
- **Showcase new materials**
展示新材料
- **Demonstrate new construction techniques**
展示新的建筑技术
- **Provide research opportunity**
提供研究机会
- **Build political will**
建立行政意愿



Attributes of Good Demonstrations 成功示范工程的因素

- **Sufficiently large with good diversity**
规模够大，具有良好的多样性
- **Well documented**
制作完善的文件
- **Demonstrate multiple objectives; Innovation is rewarded**
示范多重目的；奖励创新
- **Comprehensive support technically and financially**
技术和财政的全面支持
- **Coupled with incentive programs** 伴随激励方案
 - **Administrative** 管理
 - **Technical** 技术
 - **Financial** 财政
- **Lessons learned are incorporated into Standard and Code implementation process**
经验教训纳入标准和规范的实施过程



Standards Development 制定标准

- **All facets of the market should be involved**
应有各个市场层面的参与
- **Technical AND political process**
技术和行政过程
- **Could take years: slow development, fast implementation**
可能需要很多年：慢速制定、快速实施
- **Involves measured data and professional judgment**
包括实测的数据和专业判断



Standards Development 制定标准

- **Balance technical potential, economic factors, design and construction capability**
平衡技术潜力、经济因素、设计和施工能力
- **Should involve wide range of stakeholders**
应有利益各方的广泛参与
- **Shanghai could set second tier of standards to complement Transition Zone**
上海可制订第二阶段标准，以补充过渡区标准
- **For the first set of standards, it's better to have 10% savings and 90% implementation than 90% savings and 10% implementation**
对于第一部标准，宁可要求节能10%并实施90%，也不宜要求节能90%而只实施10%



Shanghai Based Standards 上海特色标准

- **Begins with Transition Zone standard**
始于“夏热冬冷”地区标准
- **Shanghai is a leader, can go beyond**
上海是龙头，有能力超越
- **Improve energy-saving features**
改善节能特色
- **Add water efficiency, materials and IEQ considerations**
加入节水、材料、室内环境质量的内容
- **Promulgate with 2nd more stringent tier**
与更加严格的第二阶段标准共同颁布
- **Improve economic and social development**
提高经济社会发展水平



“Early Adopter” Programs “早期采用标准者”方案

- **Large scale field demonstration of standards**
大规模的实地标准示范
- **Primes the market for design capability and materials availability**
使市场做好设计能力和材料准备
 - “on the job” training for code inspectors
对规范实施检查员进行“在职培训”
- **Programs must be administered and delivered**
必须对方案进行管理和兑现。
 - **Infrastructure must be ready to go when program is launched**
发起方案时，基础条件必须到位。
 - **Could be done either by government or private sector**
可由政府或企业界进行。



“Early Adopter” Programs “早期采用标准者”方案

- **Excellent candidate for incentives**
最好的激励措施
 - **Financial: Partial payment of marginal costs**
财政：支付部分边际成本
 - **Administrative: Expedited permit review; increased density allowances**
管理：加快许可证审批、允许增加建筑密度
 - **Technical: Design assistance; computer modeling**
技术：设计支持、计算机模拟。
- **Incentives will be most effective coming from the proper entity (Utility or Government)**
来自适当实体（电力公司或政府）的激励措施最有效



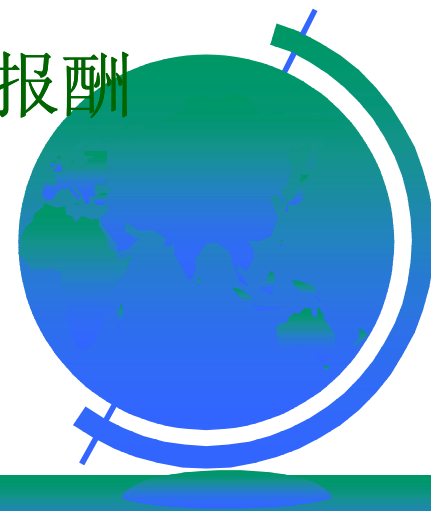
Code Implementation 规范的实施

- **Move from a standard to a code**
从标准到规范的转化
 - **A standard is a performance level**
标准是一个性能水平
 - **A code is a legal requirement to meet that level of performance**
规范是为了实现性能水平的法律规定
- **Entire industry must be aware of standard: Designers, builders, industry**
整个业界都必须知晓标准：设计师、建筑商、产品材料行业
- **Training at all levels required**
要求在各个层次上进行培训
- **Requires support materials and tools to be developed**
要求开发辅助材料和工具



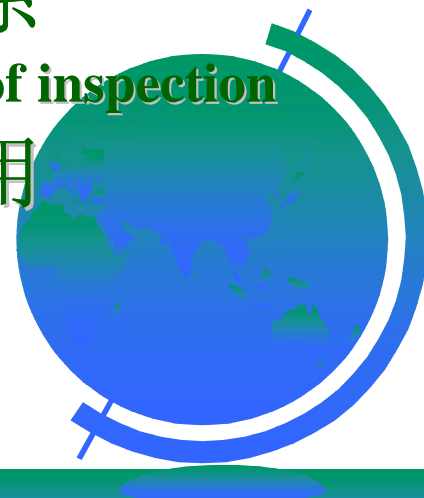
Code Implementation 规范的实施

- **Enforcement and administration mechanisms must be developed**
必须建立强制实施和管理机制
- **Enforcement is essential, otherwise standards won't be taken seriously and potential benefits will be lost**
强制执行至关重要，否则标准不会得到重视、且失去其潜在效益
- **Enforcing officials or agents must be well-trained and well paid**
执行官员或代理人必须得到充分培训和丰厚报酬
 - **Easier to bribe than comply**
贿赂比执行规范更容易
- **Should be financially self-supporting**
财政上应自给自足



Code Implementation 规范的实施

- **Could be done by existing inspectors**
可由现有的检查人员进行
 - **More will have to be hired**
将不得不聘请更多人员
- **Could be done by private firms**
可由私营公司进行
- **Can not have any ties to development or construction firms**
不得与开发商或建筑公司有任何联系
- **Political will needed to charge developers for cost of inspection**
需要行政意愿向开发商收取检查费用
- **Goes against trend to downsize government**
与压缩政府编制背道而驰





Going Beyond Standards: Market Transformation

超越标准：市场转型

- **Mandatory Codes: “If you built it any worse, it would be illegal”**
强制性规范：“如果你建的房子比规范要求的还差，则属非法”
- **Industry collaboratives: voluntary market-based standards**
业界合作；自愿的基于市场的标准
- **Labeling 标识**
- **Incentive programs 激励方案**
- **Procurement programs 采购方案**





Going Beyond Standards: Market Transformation

超越标准：市场转型

- **Mandatory Codes: “If you built it any worse, it would be illegal”**
强制性规范：“如果你建的房子比规范要求的还差，则属非法”
- **Industry collaboratives: voluntary market-based standards**
业界合作；自愿的基于市场的标准
- **Labeling 标识**
- **Incentive programs 激励方案**
- **Procurement programs 采购方案**



Industry Collaboratives 业界协作

- **Groups of manufacturers and producers**
制造商和生产商集团
 - **Can include other members**
可以包括其它成员
- **Can develop labels**
可开发标识
- **Can develop consensus performance standards**
可开发达成共识的性能标准
- **Can be a sub-group of a larger industry**
可以是一个更大行业的分支集团





Industry Support for Market Transformation

业界对市场转型的支持

- **Broad-based industry groups can help support market transformation**
基础广泛的业界团体可帮助支持市场转型。
- **Shanghai should form a local “green building council”**
上海应形成本地的“绿色建筑协会”。
 - **NRDC and others would be willing to assist**
NRDC等组织愿意提供帮助。
- **Cooperation will create a bigger “pie”**
合作将创造“大蛋糕”。
 - **Companies can learn from each other and grow new industry**
公司可相互学习并培育新的产业。
 - **As market grows can compete for new business**
随着市场增长可竞争新业务。
- **U.S. Green Building Council is a model**
美国绿色建筑协会是一个范例。

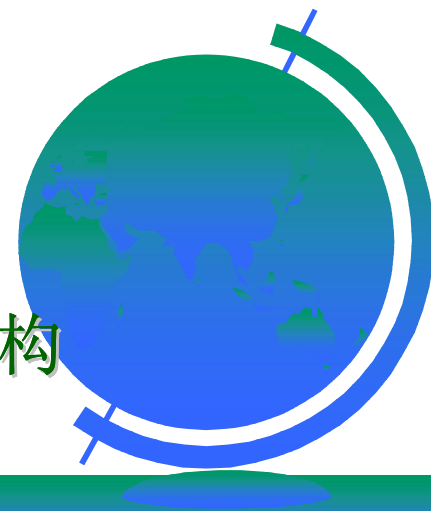




U.S. Green Building Council Membership

美国绿色建筑协会会员

- **Product Manufacturers** 产品生产商
- **Building Control and Service Contractors**
楼宇控制及服务承包商
- **Utility Companies** 电力公司
- **Real Estate Owners, Managers, Users,** 业主、经理人、用户
- **Professional Societies** 专业协会
- **Environmental Organizations** 环境保护机构
- **Federal, State and Local Governments** 联邦、州、地方政府
- **Professional Firms** 专业公司
- **Contractors, Builders** 承包商、建筑公司
- **Financial (Lenders, Insurers, Others)**
金融机构（贷款行、保险公司、其它）
- **Universities and Research Institutes** 大学及研究机构





U.S. Green Building Council 美国绿色建筑协会

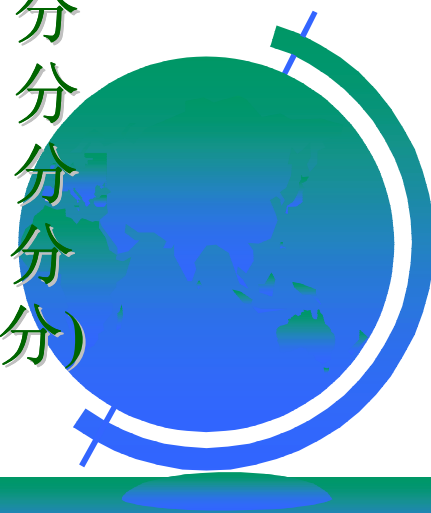
- **The organization's purpose is to:**
该组织的目标是:
 - *Integrate building industry sectors*
整合建筑业
 - *Lead market transformation*
领导市场转型
 - *Educate owners and practitioners*
培训业主和从业人员
- **Developer and administrator of the LEED™ Green Building Rating System**
绿色建筑评估体系**LEED™**开发和管理



Technical Overview of LEED™

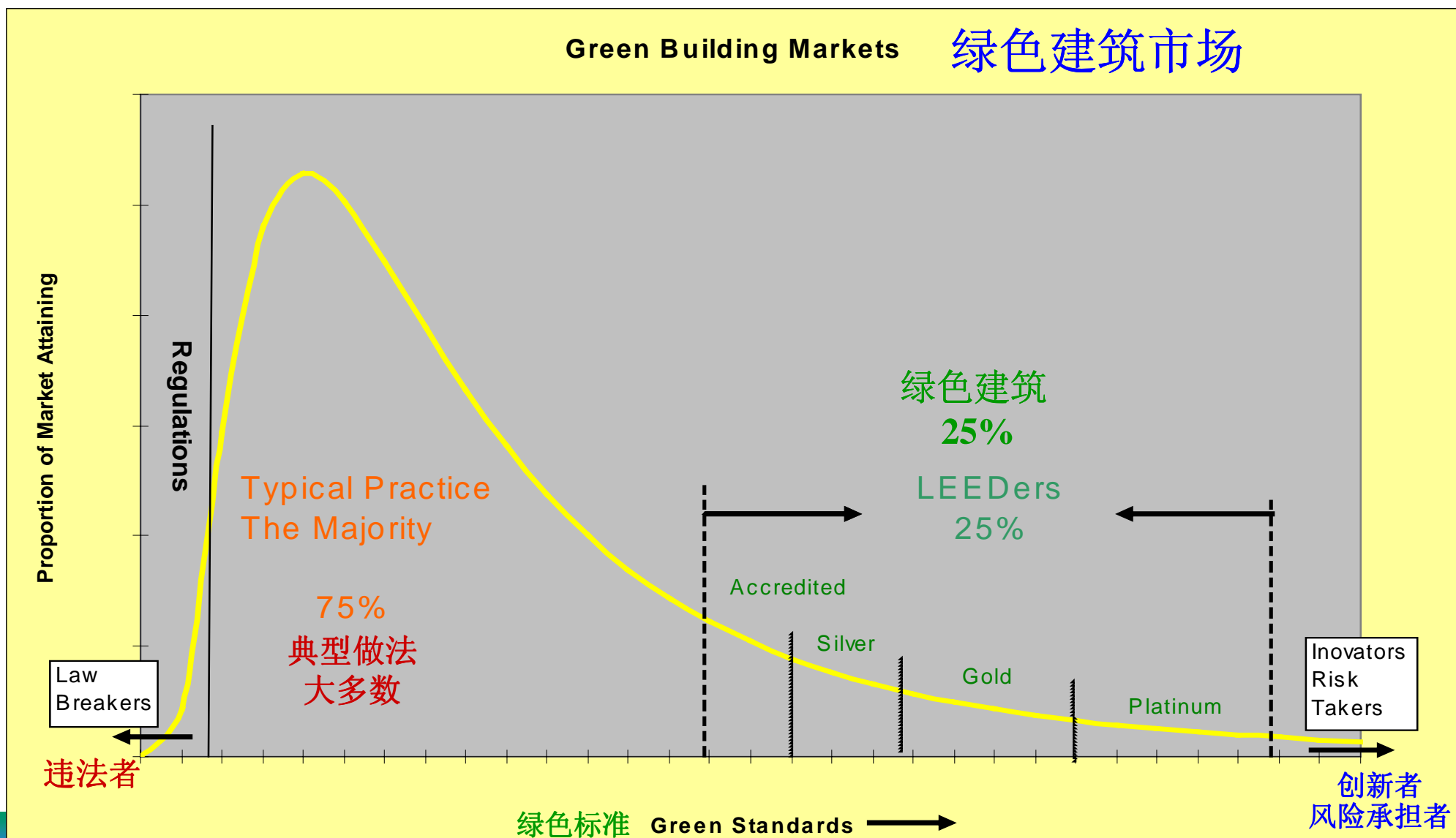
LEED™技术概要

- **Whole-building approach encourages and guides a collaborative, integrated design and construction process**
整体建筑理念鼓励并引导协作、整合的设计和施工过程
- **Optimizes environmental and economic factors**
优化环境与经济因素
- **Four levels of certification 4个认证等级**
 - **LEED Certified (LEED认证级) 40-50% 分**
 - **Silver Level (银级) 51-60% 分**
 - **Gold Level (金级) 61-80% 分**
 - **Platinum Level (白金级) > 81% 分**
(有可能达到69分)



Where LEED Fits in the Market

LEED市场定位





Build BUSCOs to Support Market Transformation

建立建筑服务公司 支持市场转型

- **Need to leapfrog to BUILDING SERVICES COMPANIES (BUSCOs) for the 21st Century**
需要为21世纪蛙跳至建筑服务公司（BUSCO）。
- **ESCOs are 1980s institutions**
能源服务公司是20世纪80年代的机构。
 - **Buildings' cost centers, needs and impacts are far more diverse**
建筑成本中心，需求和影响更多元化；
 - **Green buildings are the future**
绿色建筑是未来趋势。
- **Will need delivery infrastructure to meet market demand created by regulations and incentives**
将需要提供服务的基本机构，以满足由监管和激励造成的市场需求
- **Broad skill sets needed: design, engineering, maintenance**
需要广泛的技能：设计、工程、维护。
 - **Energy, water, materials, landscape, IEQ**
能源、水、材料、地形、室内环境质量。



Labeling 标识

- **Can confirm compliance with a performance requirement specified in a code or standard**
可以确认满足规范或标准规定的某种性能要求
- **Is important aid to ensuring compliance**
是确保达标的重要帮助
 - **Energy performance of windows and equipment**
窗和设备的能耗性能
- **Give information to decision makers and the public**
向决策者和公众提供信息
- **Can be used to award incentives**
可用于授予激励



Energy Labels 节能标识





National Fenestration
Rating Council

CERTIFIED

World's Best Window Co.

Millennium 2000[®] Casement
CPD#000-s-000

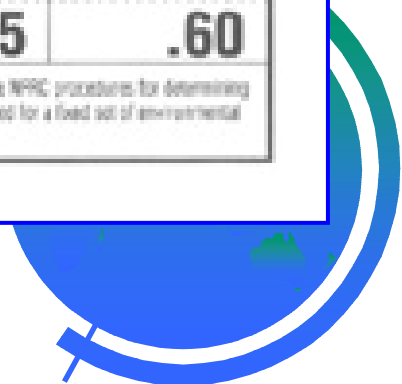
Vinyl-Clad Wood Frame • Double Glaze
Argon Fill • Low E • Solar Control Coatings

ENERGY Performance

- Energy savings will depend on your specific climate, house and lifestyle
- For more information, call 1-800-123-4567 or visit NFR's web site at www.nfr.org

Technical Information						
Res	U-Factor	.32	Solar Heat Gain Coefficient	.45	Visible Transmittance	.58
	Non-Res	.31		.45		.60

Manufacturer stipulates that these ratings conform to applicable NFR procedures for determining whole product energy performance. NFR ratings are determined for a fixed set of environmental conditions and specific product sizes.



Procurement Programs 采购方案

- **Exercise of market power**
行使市场力量
- **Benchmarked on voluntary labels or standards that go beyond the market**
基准于超出市场的自愿标识或标准
- **Can be based on certain attributes: e.g. recycled content**
可基于某些属性，如：再生材料含量



Procurement Programs 采购方案

- **Based on economic & performance benefits**
基于经济和性能效益
 - **Lifecycle performance instead of first cost**
寿命周期性能而非一次性费用
 - **Internalize pollution and damage costs**
污染和损害成本内在化
- **Give preference to energy efficient or environmentally superior products or services**
给予节能或环保杰出产品或服务优惠待遇
 - **Performance contracting** 性能合同
 - **Recycled paper** 再生纸



Procurement Programs 采购方案

- **Shanghai should require all government and government supported buildings to be green**
上海应要求所有政府建筑和政府支持的建筑都成为绿色建筑
- **Government should provide incentives for large developers to do the same**
政府应激励大开发商开发绿色建筑。





Incentives 激励

➤ Bonus given to encourage certain actions

鼓励某些行动的奖励

➤ Can be monetary or non-monetary

可以是货币性或非货币性的

➤ Development density bonus

开发密度奖励

➤ Expedited permit review and plan approval

加快许可证和规划审批过程

➤ Based on performance as verified by a standard or label

基于通过标准或标识查核的性能

➤ Can be based on needs of incentive provider

可基于激励提供者的需要

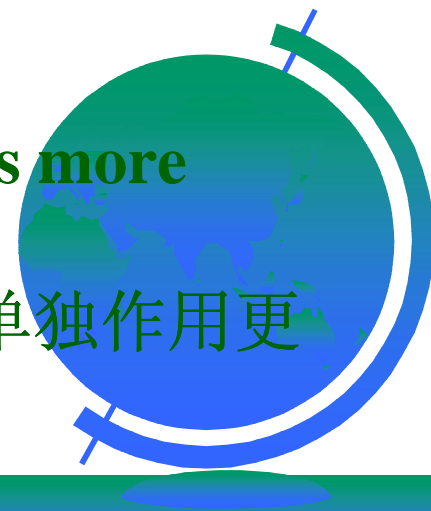
➤ Can also be demonstrated by applicant

也可由申请者证明



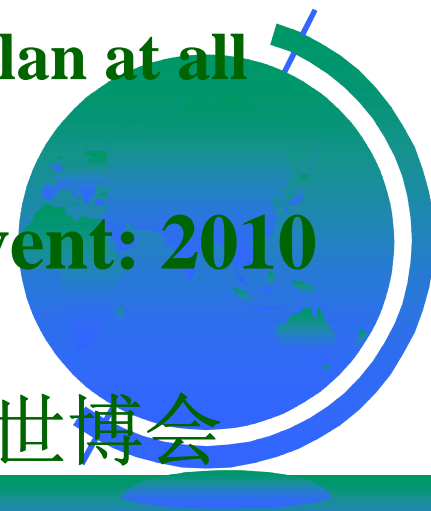
Conclusions 结论

- **Buildings are key to social, economic and environmental development**
建筑对于社会、经济、环境发展至关重要。
- **Problems require comprehensive solution: Green Buildings**
建筑的问题需要全面的解决方案：绿色建筑
- **Government and private sector can work together to make this happen**
政府和企业界可共同实现这一目标。
- **Regulatory push combined with market pull is more powerful than either by itself**
监管推动与市场拉动的共同作用比其中一项单独作用更加有力



Next Steps 今后的工作

- **Market transformation plan should be developed**
应制定市场转型的方案
 - **Should involve government and private sector stakeholders**
应有政府和相关企业参加
- **Resources also must be allocated**
必须配备资源
 - **A plan without resources is worse than no plan at all**
没有资源的方案比根本没有方案更糟糕
- **Set full implementation target for key event: 2010 World Expo**
为重要活动制定全面实施目标：2010年世博会





QUESTIONS?

问题？

Improved Shanghai Standard 优化的上海标准

- **Should add more insulation to roof**
应增加屋面保温
 - **$K = 0.6$ for $D \geq 3.0$ and $K = 0.4$ for $D \geq 2.5$**
 - **Better comfort for top floor tenants**
为顶层用户提供更大的舒适度
 - **Not expensive and is cost-effective**
费用不高且具有成本效益
- **Increase window requirements**
增加对窗的要求
- **Require testing and labeling of windows**
要求对窗进行测试并采用标识
 - **Being proposed in context of cooling zone std**
已提议在南方标准中采用



Second-Tier of Standard 第二阶段标准

- **Increased requirements with a delayed implementation date (2006)**

晚些时候(2006年)实施高的一层要求

- **Roof: K-value between 0.4 & 0.5**

屋面: $K=0.4-0.5$

- **Walls: K-value between 0.6 & 1.0**

墙体: $K=0.6-1.0$

- **Windows: U-value between 2.5 & 3.2; Shading coefficient between 0.35 & 0.55**

窗: $U=2.5-3.2$ 遮阳系数= $0.35-0.55$

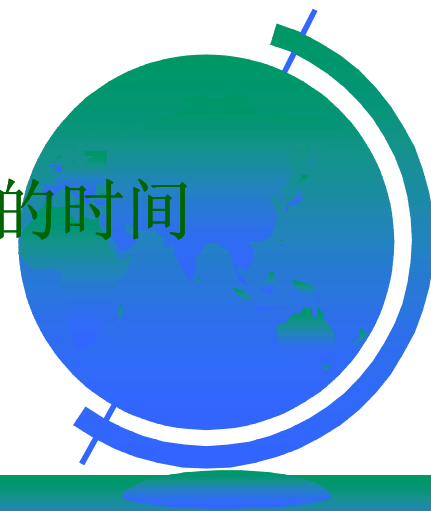
- **Based on economic cost-effectiveness analysis**

基于经济效益分析

- **Gives market time to adjust** 给市场留出调整的时间

- **Producers** 生产商

- **Builders** 建筑商



Sustainable Sites 可持续性场址

- **Erosion & sediment control (PR)**
侵蚀及沉积控制
- **Site selection**
选址
- **Urban redevelopment**
城市再开发
- **Brownfield redevelopment**
褐地再开发
- **Alternative transportation**
可替代交通
- **Reduced site disturbance**
减少对场址的影响
- **Stormwater management**
雨水管理
- **Landscape & exterior design to reduce heat islands**
降低热岛效应的地形和外部设计
- **Light pollution reduction**
减少光污染



Water Efficiency 用水效率

- **Water efficient landscaping**
提高用水效率的地形设计
- **Innovative wastewater technologies**
创新的废水处理技术
- **Water use reduction**
减少用水量



Energy & Atmosphere 能源与环境

- **Fundamental building commissioning (PR)**
建筑基本系统试运行调试
- **Meet ASHRAE/IES 90.1-1999 (PR)**
符合**ASHRAE/IES 90.1-1999**
- **Eliminate CFCs (PR)** 消除氟利昂
- **Exceed ASHRAE/IES 90.1-1999 by 20-60%**
超过**ASHRAE/IES 90.1-1999: 20-60%**
- **Use of alternative or renewable energy**
使用可替代或可再生能源
- **Additional commissioning** 其它系统试运行调试
- **Eliminate HCFCs and Halons** 消除氢氯化烃和哈龙
- **Measurement and verification** 检验和查核
- **Green power contract** 绿色电力合同



Materials and Resources 材料与资源

- **Storage & collection of recyclables (PR)**
可回收物的储存与收集
- **Building reuse 建筑再利用**
- **Construction waste management**
建筑垃圾管理
- **Resource reuse 资源再利用**
- **Use of materials with recycled content**
使用含有再生成份的材料
- **Use of local/regional materials**
使用当地材料
- **Rapidly renewable materials**
快速再生材
- **Certified wood 认证的木材**



Indoor Environmental Quality 室内环境质量

- 满足 **ASHRAE 62-1999** 的要求(PR)
- **Control environmental tobacco smoke (PR)** 控制室内吸烟
- **CO2 monitoring** 二氧化碳监测
- **Ventilation effectiveness (ASHRAE 129)** 有效通风
- **Construction IAQ Management Plan**
建筑室内空气质量管理方案
- **Low-emitting materials** 低挥发性材料
- **Indoor chemical and pollutant source control**
室内化学及污染源控制
- **Controllability of systems** 系统的可控性
- **Thermal comfort** 热舒适性
- **Daylight & views** 自然光及景观

